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tages of the mechanical preparation of iron are not to be denied," says Viollet-le-Duc in his "Dictionary of Architecture," "it is certain, however, that the smiths of that time acquired the habit of handling the iron at will, and became thoroughly acquainted with its qualities. Up to twenty-five years ago, since the application of mechanics to the preparation of iron, a workman capable of making by hand the simplest grate, as in the old times, would have been sought for in vain; and, if any is now to be found, we are indebted for the finding to the new impulse given to the trade by the researches made in late years in the industrial arts of the Middle Ages." In this statement are epitomised the causes of the excellence of those iron-workers. Grates, railings, &c., of the eleventh and the twelfth centuries are still in existence, which bear witness to their skill. These works deserve more than a passing notice; their lines were interlaced in attractive designs; the wrought stems were delicately lengthened out at once strong and light, and expanded with natural grace into leaves, fruits, and symbolic figures. M. Dideron has published some of these old gratings in his "Archæological Annals" that are actually masterpieces of workmanship. Yet, however skilful, the French artisans were excelled by the Italians, as a comparison between the typical specimens afford-

ed by our cuts, Nos. 16 and 17, will readily show. The Italians often introduced allegorical figures in their works that well expressed the purpose of the object they ornamented. Nothing, we deem, can be more appropriate to a railing surrounding a garden than the dog-heads that are seen in our illustration No. 16. But the work in which the smiths, both of Italy and France, in the thirteenth century excelled anything that had been done so far, was the fabrication of door-hinges. Whether their design was simple or rich, they were always tasteful. These hinges were formed of branches springing from foliated bands, and separated from each other by scroll-work of a similar character. These enrichments are composed of birds, lizards, roses, grapes, and different kinds of foliage, employed with a degree of profusion and chased with an amount of delicacy calculated to show that their cost was a matter of but little consideration. Most famous among the works of this description are the hinges which decorate the doors of Notre-Dame of Paris (cut No. 18). The following ages, astonished at so much excellence of workmanship, could do no better than to attribute them to the intervention of the devil.

MAURICE MAURIS.

[To be continued.]

AUTOTYPE AND ITS RELATION TO ART.



FOR about ten years a process of photographic printing yclept "autotype" has been growing into notice, and asserting its right to occupy the field of Art Photography. It not only claims to have solved the problem of rendering the photographic image inalterable, but by the command of a wide range of monochromic effect, and of different surfaces for the reception of the picture, to have rendered practicable the reproduction of an artist's work in fac-simile. For example, an artist expresses his ideas in charcoal, in crayon, in sepia, or red chalk; the process is able to replicate his work, the same size, or larger, or smaller, employing the pigment of the original and the same kind of paper or foundation. The copy in such case may reasonably be believed to be as permanent as the original. A drawing or other artistic work reproduced by ordinary photographic means is palpably but a photograph: printed in autotype it will be so close a fac-simile of the original as not easily to be distinguished from it.

The autotype thus claims under favourable circumstances to reproduce the very body and soul of an artist's work—his touch and sentiment, with the actual pigment of his palette and the material he works upon. Effecting this by chemical means without the intervention of another hand, the process found a sponsor to name it Autotype.

The starting-point of all photographic pictures is the production of a negative in the camera. The negative becomes a matrix of endless prints. Most of our readers are familiar with a negative, and have noticed how the lights and shadows of the image on the glass are reversed; the high lights of the subject being represented by a dense deposit, while its shadows approach the condition of clear glass. It follows that light will be retarded in its passage through a negative exactly in proportion to the varying density of the image on its surface, and the art of photographic printing consists in providing that the transmitted light shall impinge on a surface sensitive to its impression. This has hitherto been effected by the use of a paper coated with a thin stratum of albumen and rendered sensitive to light by a salt of silver. Photographs so produced are liable to gradual spontaneous decay, and fade away to the pale ghosts of their former selves, and ultimately disappear.

Autotypy claims permanency for its *raison d'être*. The difference it imports into photographic printing consists principally in substituting for the fickle salts of silver some permanent pigment as the physical basis of the picture. This substitution not only supplants the evanescent by what is practically inalterable, but endows photographic Art with the wide range of monochromic effect. Photography in natural colours is still a dream, but autotypy is able

to make some slight advance towards Art in this direction. The process is founded on the property of gelatine when combined with a bichromate salt to become insoluble in water after having been exposed to light. Paper is coated with a film of liquid gelatine containing finely ground colour and sufficient of the bichromate salt to insure chemical action. This sensitive tissue, kept from the light, is perfectly soluble in water; but if light acts upon it the whole condition is altered: the gelatine becomes insoluble, and firmly imprisons every particle of the colouring matter. It will now be understood that if this sensitive tissue be placed under a negative and exposed to light, the chemical action exerted upon it will be in proportion to the density of the negative; where much light passes, the tissue will be deeply penetrated and much colour imprisoned; where the light is partially intercepted less colour will be fixed, and a latent picture will be formed in the tissue in exact gradation, and with the lights and shadows as in nature.

To make this latent picture visible, it is, in technical language, "developed" by the action of warm water, washing away such portions of the coloured gelatine film as have not been influenced by light. But effective development is only possible by an ingenious operation known as "transfer." The impact of light through the negative on the surface of the tissue has rendered that surface insoluble, and to achieve success the pictorial film must be attacked at the *back*, that is, at the surface resting on its paper support. The various methods of effecting this constitute an important part of the autotype patents.

The sensitive tissue which, under the negative becomes fecundated by light is called the "temporary support," and the surface of this is made to adhere by pressure to the material on which the picture shall finally remain. This "permanent support" may be drawing-paper, canvas, panel, ivory, or, in fact, almost any material used by artists. The two adhering supports are immersed in warm water, which softens the gelatine, and allows the original paper or temporary support to be peeled off, and thus lays bare to the action of the water all the pigmented gelatine unaffected by the light. Under the solvent action of water the picture gradually appears and remains firmly adherent to its support. The lights and shades of this picture are built up by various degrees of thickness in the gelatine and pigment, representing exactly the gradations of density of the original negative and the consequent modifications of the action of light. The developed pictures, after being immersed in a solution of alum, washed in pure water, and hung up to dry, are trimmed and mounted in the usual way. Such photographic pictures consist of particles of pigment held together by an incredibly thin film of gelatine, rendered insoluble by chemical agency.